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Compositional Analysis of Carbohydrates of a Family of Legumes

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Legumes, most commonly identified as beans or lentils, provide a good source of both protein and carbohydrates. Many legumes contain the polysaccharide arabinogalactans, classified as dietary fiber and have unique functional properties in foods. However, these, and other plant polysaccharides have not been well characterized. A preliminary collaborative study between Florida State University and the Whistler Center at Purdue indicated that isolated legume arabinogalactans appear to have high texturizing capability through formation of viscoelastic structures. Their soluble property may also present unique fiber nutritional trait. These properties of arabinogalactans and their variability among different legumes are yet to be analyzed. In this study the carbohydrate composition of the 24 most common legumes were analyzed. Gas chromatography (GC) is routinely used to determine the carbohydrate, or monosaccharide, composition by hydrolyzing and converting sugars into volatile derivatives. Results from the experiment revealed that the legumes varied in their abundance of both arabinose and galactose. Legumes with higher relative abundance of these polysaccharides have higher dietary fiber content. These results provide a better understanding of carbohydrate composition of legumes including arabinogalactans. In the remainder of the project, variability in polysaccharide contents and ratios of arabinose/galactose will be assessed to obtain a comprehensive picture of the structural differences among the arabinogalactans of the 20 legume varieties. In the future, continuing with linkage analysis of arabinogalactans will enable us understand detailed structure of the polysaccharides and identify chemical and genetic markers for breeding of high quality legumes or development of new bean varieties.